ORD.: N° 0708

ANT.:
- Letters from the supplier dated 08/18/2020 and 11/04/2020.
- Email from supplier dated 08/07/2020.

MAT.: Reference soil UCS results with ABCdust DMS DS Stabilizer.

INCL.: Appendix of results (A and B).

La Florida, 28 DEC 2020

FROM : JEFE DEPARTAMENTO LABORATORIO NACIONAL DE VIALIDAD

TO : SR. RAFAEL TOLEDO S. - GERENTE GENERAL ABCDUST GESTIÓN Y SUPRESIÓN DE POLVO LIMITADA

The results of unconfined compressive strength (UCS) measurements of 13 specimens made with different doses of the product identified as DS from the company ABCDust are reported to you. The materials for the preparation of the reference soil and the stabilizer were provided by the supplier.

The DS stabilizer is a water-soluble liquid additive with a 16% solid residue and was initially conceived as a dust suppressant. For this study, it was requested to test this product as a soil stabilizer. For the study, doses of 0, 0.5, 1, 2, 3, 4 and 5% were applied with respect to the dry weight of the soil.

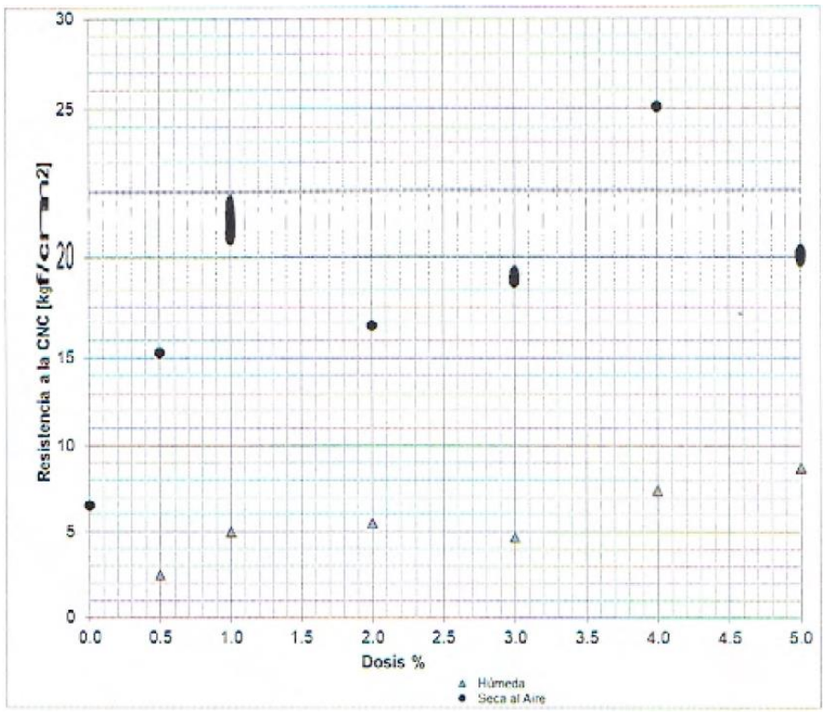
The samples were compacted to an average dry density of 2.16 g/cm3 at a nominal compaction humidity of 7.0%, keeping constant the sum of the volume of water and product in each test specimen. Two series of 6 specimens each were made with the doses mentioned above, plus an extra specimen as a blank without product. The specimens were tested at single compression after 7 days of room curing. One of these series was tested with an average residual humidity of 0.65% at the end of this curing period (dry condition) and the second series was re-wetted to an average humidity of 5.5% (wet condition) to measure the sensitivity of the product to water.

Summary of Results:

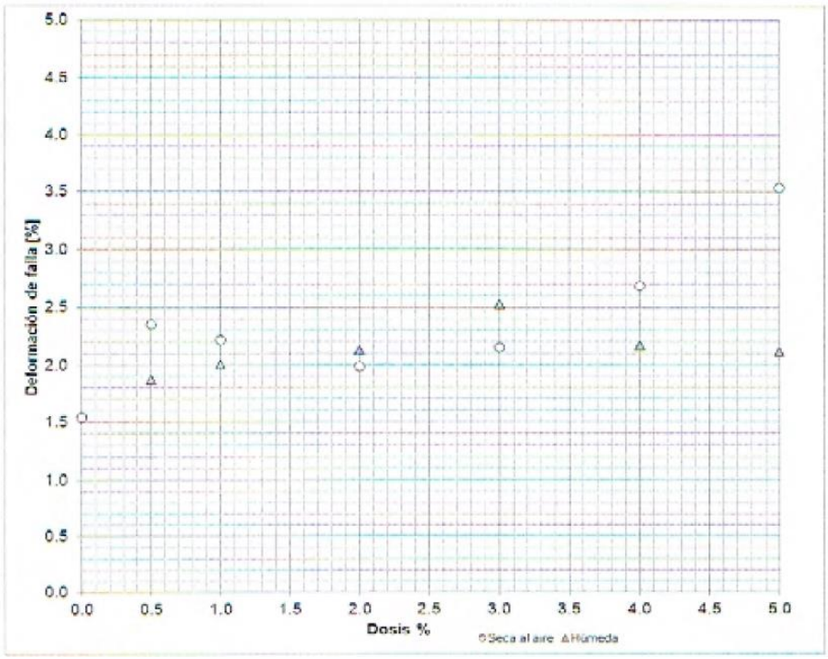
The results obtained are shown in Table N°1 and Graphs N°1and N°2.

Table N°1. Results of Reference Soil with DS of ABCDust.

Dosis	σ_f	ε_f	γ_d	ω_{ensayo}
[%]	[kgf/cm2]	[%]	[kg/m3]	[%]
0.0	6.6	1.54	2129	0.57
0.5	15.3	2.35	2155	0.65
1.0	20.6	2.21	2169	0.70
2.0	16.8	1.99	2114	0.80
3.0	19.5	2.15	2130	0.60
4.0	25.1	2.69	2180	0.60
5.0	20.1	3.53	2131	0.65
0.5	2.47	1.88	2150	5.25
1.0	4.98	2.01	2178	5.49
2.0	5.49	2.13	2177	5.22
3.0	4.65	2.53	2167	5.97
4.0	7.43	2.17	2208	5.43
5.0	8.73	2.12	2180	5.64



Graphic N°1: UCS resistance of the reference soil stabilized with DS.



Graphic N°2: Deformation at failure in UCS test with DS.

From Table N°1 and Graphs N°1 and N°2 it is observed that the minimum required resistance of 5kgf/cm2 is exceeded for the dry state. A dosage of more than 3.5% is required to exceed this minimum resistance with the reference soil in the wet state. The minimum ductility condition of 1% is met over the entire range of doses applied for the two moisture states.

From the tests conducted, it is concluded that ABCDust DS stabilizer is suitable for gravelly soils in dry weather with dosages starting at 0.5% or rainy weather with dosages of 3.5% or more. The minimum doses mentioned can be increased if the soil fines content is higher than 8% or with clayey fines.

The results measured correspond to those of a mechanical laboratory test with a single type of soil and do not guarantee the good performance and durability of the product in the field.

Sincerely yours.



VML/GPP:

DISTRIBUTION:

- Mr. Rafael Toledo S., Gerente General, ABCDust Gestión y Supresión de Polvo Limitada
- Oficina de Gestión Administrativa - LNV
- Subdepartamento Ensayes y Materiales
- Área de Geotecnia
- Archivo

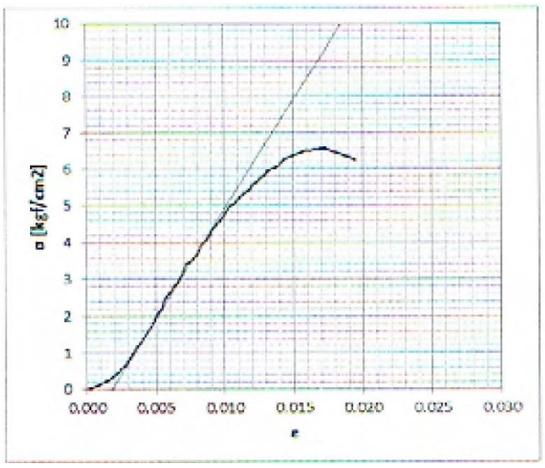
Process N°14227504
ID: 1083

PROCESO N° 14544694
LABORATORIO NACIONAL DE VIALIDAD

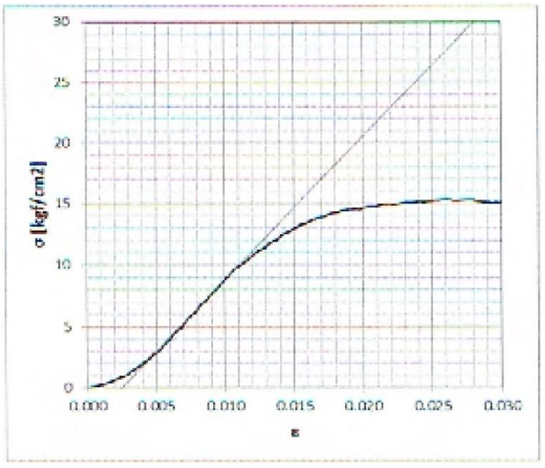
RESULTS APPENDIX

A) Air-dried test tubes

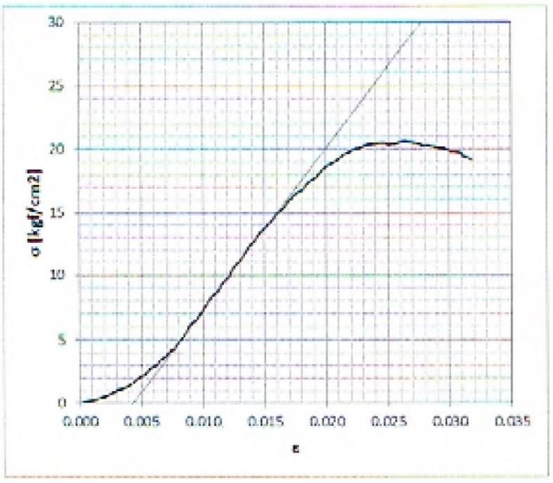
No stabilizer.



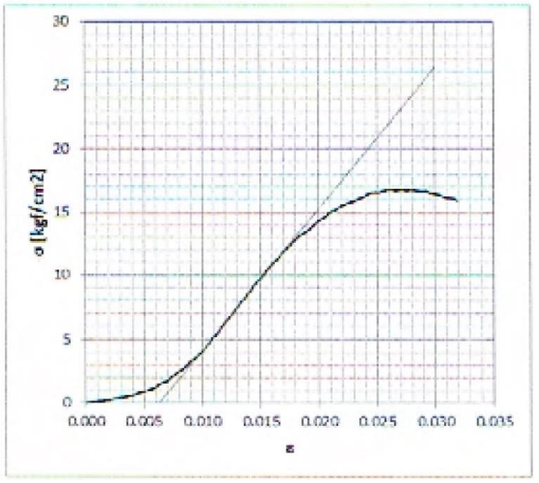
0.5% DS



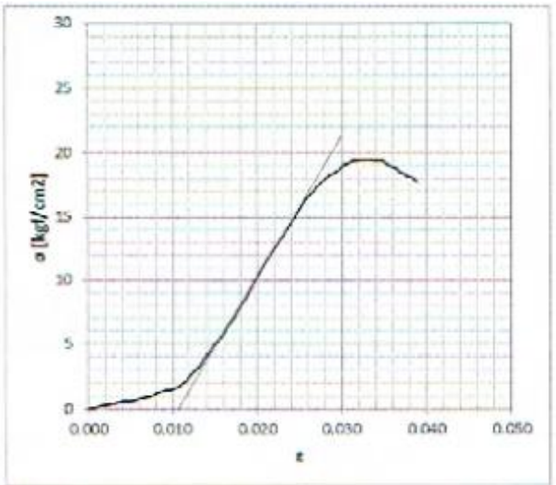
1% DS



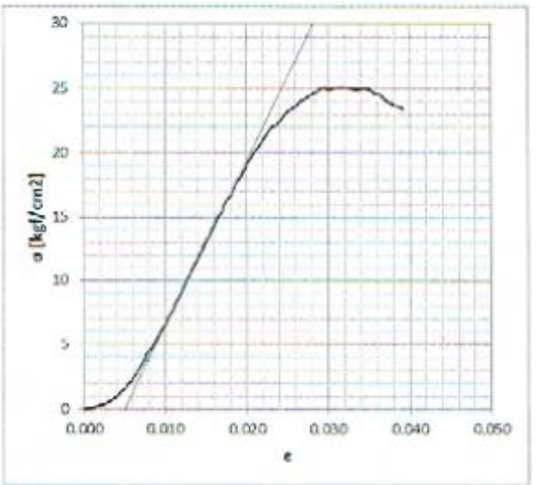
2% DS



3% DS

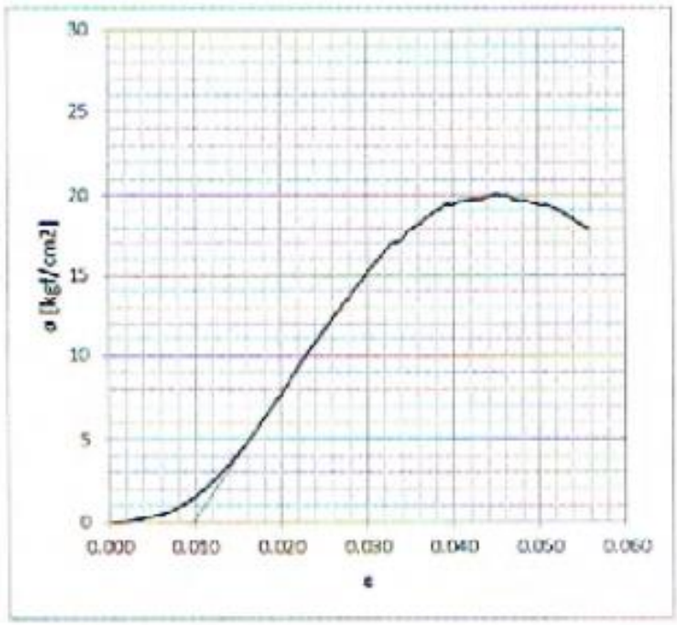


4% DS



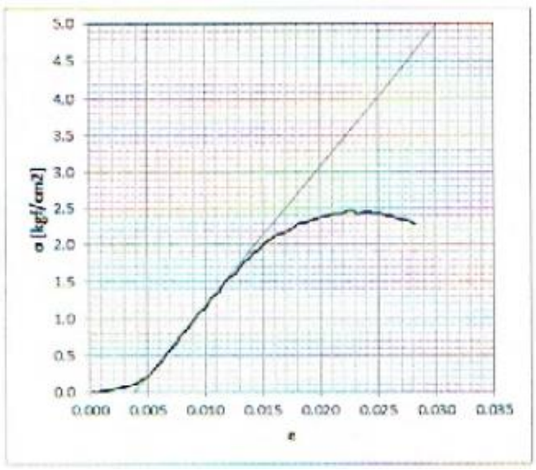
Process N°14227504 (DS product)
ID: 1083

3% DS

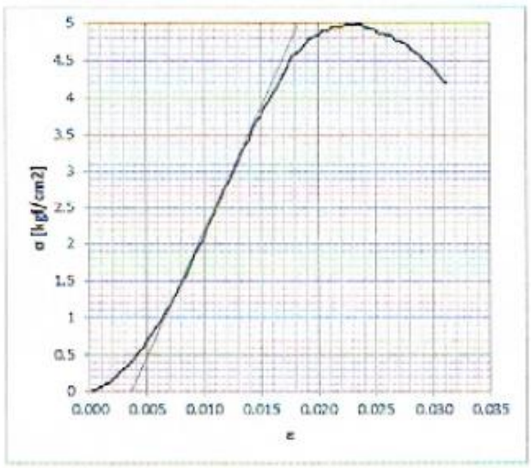


B) Rehumidified test tubes

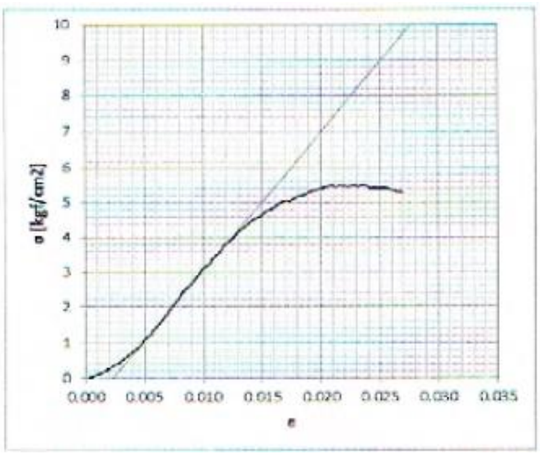
0.5% DS



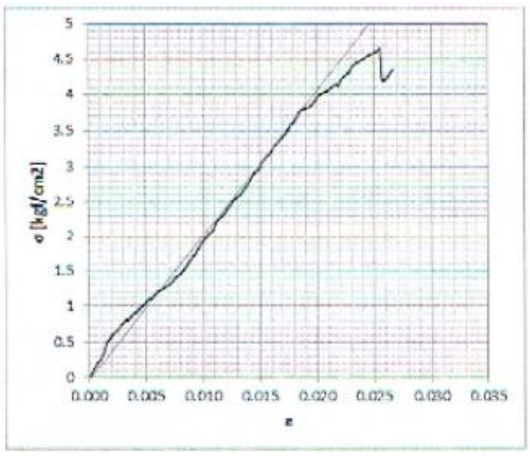
1% DS



2% DS

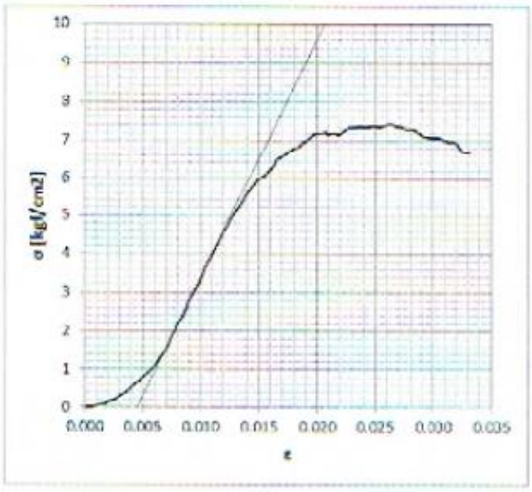


3% DS

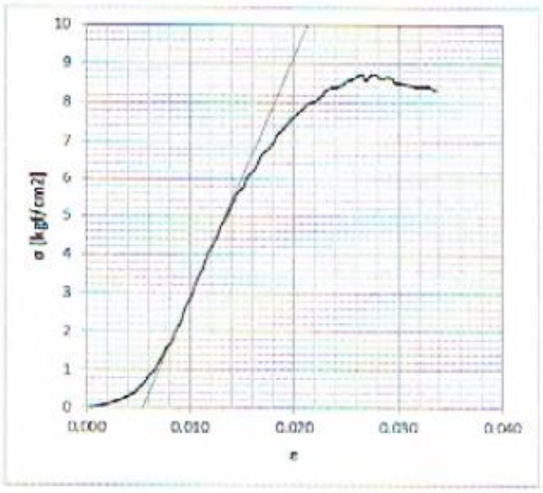


Process N°14227504 (DS product)
ID: 1083

4% DS



5% DS



Process N°14227504 (DS product)
ID: 1083

ORD.: 0707

ANT.:
- Letters from the supplier dated 08/18/2020 and 04/11/2020.
- E-mail from supplier dated 08/07/2020.

MAT.: Soil UCS results of reference stabilizer DMS-DS100 of ABCDust.

INCL.: Appendix of Results (A and B).

La Florida, 28 DEC 2020

FROM : JEFE DEPARTAMENTO LABORATORIO NACIONAL DE VIALIDAD

TO : SR. RAFAEL TOLEDO S. - GERENTE GENERAL ABCDUST GESTIÓN Y SUPRESIÓN DE POLVO LIMITADA

We inform you the results of unconfined compressive strength (UCS) measurements of 17 specimens made with different doses of the product identified as DS DMS100 from ABCDust. The materials for the confection of the reference soil and the stabilizer were provided by the supplier.

DMS DS100 is an additive for soil stabilization in liquid form, soluble in water, with 50% solid residue. For the study, doses of 0, 0.25, 0.50, 0.75, 1, 2, 3, 4 and 5% were applied with respect to the dry weight of the soil.

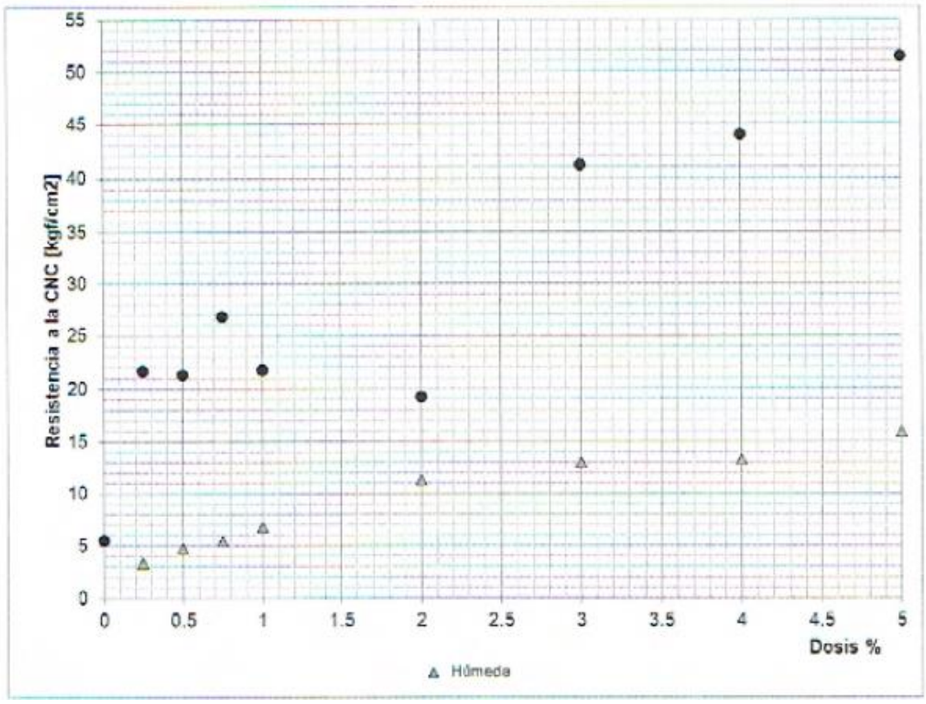
The samples were compacted to an average dry density of 2.18 g/cm3 at a nominal compaction humidity of 7.0%, keeping constant the sum of the volume of water and product in each specimen. Two twin series of 8 specimens each were made with the doses mentioned above, plus an extra specimen as a blank without product. The specimens were tested in simple compression after 7 days of room curing. One of these series was tested with an average residual humidity of 0.62% at the end of this curing period (dry condition) and the second series was re-wetted to an average humidity of 6.2% (wet condition) to measure the sensitivity of the product to water.

Summary of Results:

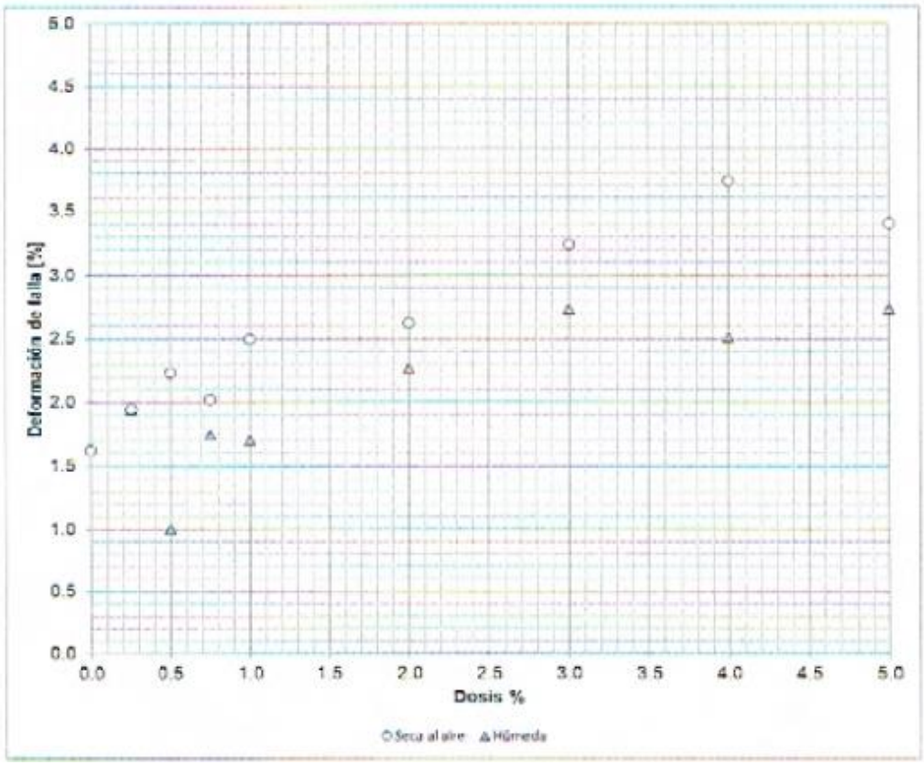
The results obtained are shown in Table N°1 and Graphs N°1 and N°2.

Table N°1. Results of Reference Soil with DMS-DS100 of ABCDust.

Dosis	σ_f	ε_f	γ_d	ω_{ensayo}
[%]	[kgf/cm2]	[%]	[kg/m3]	[%]
0.0	5.5	1.62	2141	0.66
0.25	21.7	1.95	2145	0.55
0.50	21.3	2.23	2145	0.65
0.75	26.8	2.02	2155	0.65
1.0	21.8	2.50	2151	0.65
2.0	19.2	2.62	2201	0.75
3.0	41.2	3.24	2172	0.60
4.0	44.0	3.74	2189	0.54
5.0	51.4	3.40	2278	0.54
0.25	3.35	1.94	2161	5.02
0.50	4.75	1.00	2147	5.26
0.75	5.48	1.74	2144	5.30
1.0	6.82	1.71	2153	5.40
2.0	11.26	2.26	2194	7.44
3.0	13.00	2.73	2246	7.30
4.0	13.25	2.51	2192	7.32
5.0	15.96	2.74	2209	6.73



Graph Nº1. UCS resistance of reference soil stabilized with DMS-DS100.



Graph Nº2. Deformation at failure in UCS test with DMS-DS100.

From Table Nº1 and Graphs Nº1 and Nº2 it is observed that the minimum required resistance of 5 kgf/cm^2 is exceeded for the dry state. A dosage higher than 0.75% is required to exceed the minimum strength with the reference soil in the wet state. The minimum ductility condition of 1% is met throughout the applied dosage range for the two wet states.

From the tests carried out it is concluded that ABCDust DMS-DS100 stabilizer is suitable for clean gravelly soils in dry weather with doses starting at 0.25% or rainy weather with doses of 0.75% or more. The minimum doses mentioned can be increased if the soil fines content is higher than 8% or with clayey fines.

The measured results correspond to those of a laboratory mechanical test with a single type of soil and do not guarantee the good performance and durability of the product in the field.

Sincerely yours.



VML/GPP:

DISTRIBUTION:

- Mr. Rafael Toledo S., Gerente General, ABCDust Gestión y Supresión de Polvo Limitada
- Oficina de Gestión Administrativa - LNV
- Subdepartamento Ensayes y Materiales
- Área de Geotecnia
- Archivo

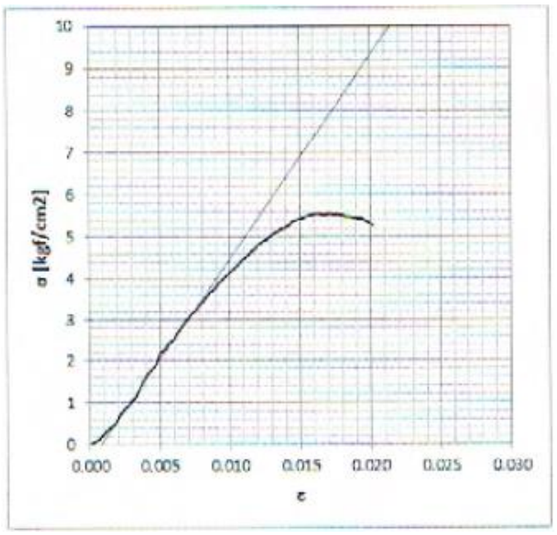
Process N°14227504
ID: 1083

PROCESO N° 14544588
LABORATORIO NACIONAL DE VIALIDAD

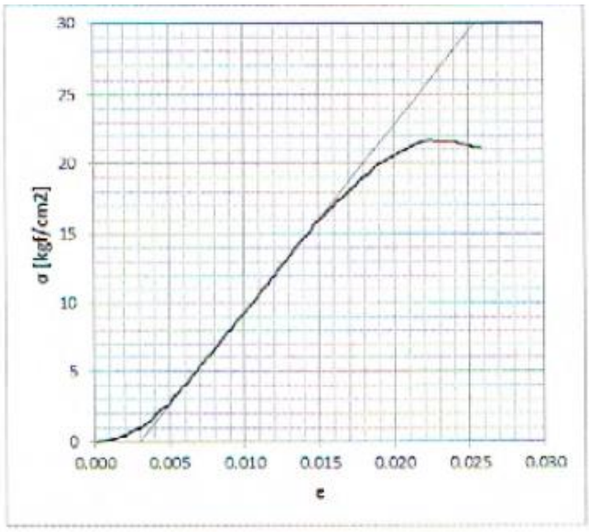
RESULTS APPENDIX

A) Air-dried test tubes

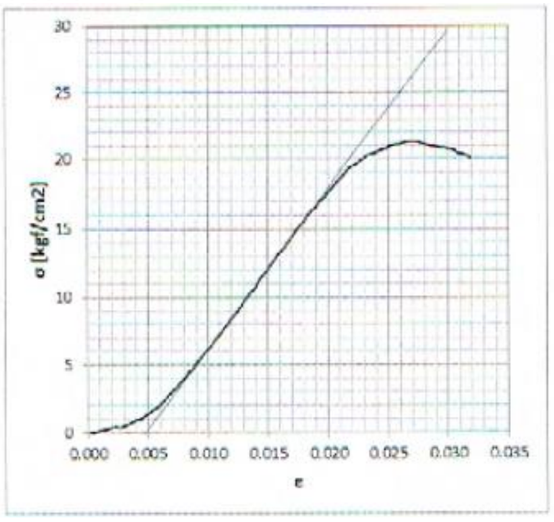
No stabilizer.



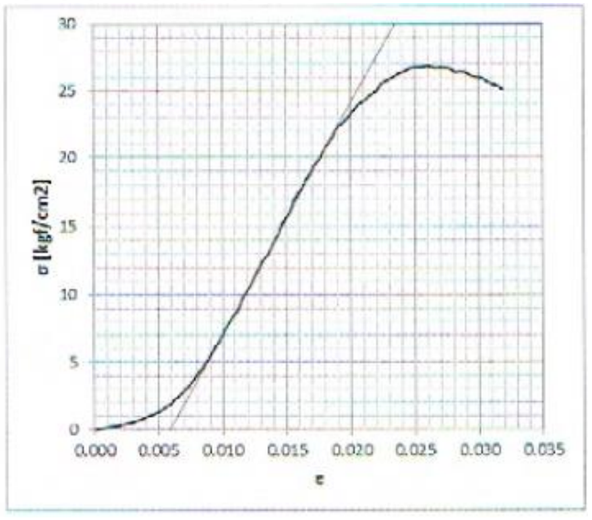
0.25% DMS-DS100



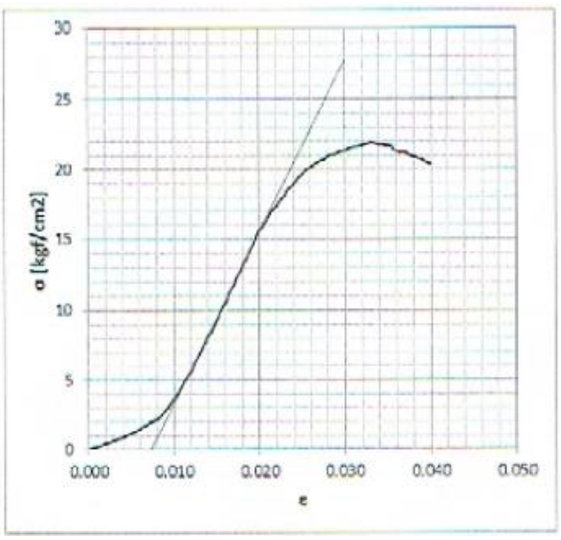
0.50% DMS-DS100



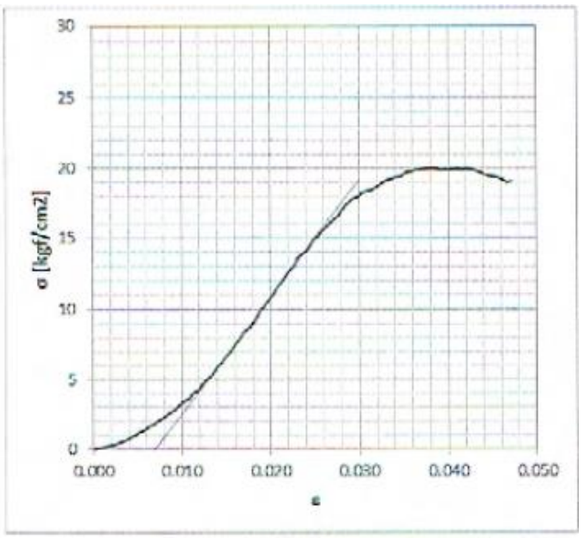
0.75% DMS-DS100



1.0% DMS-DS100

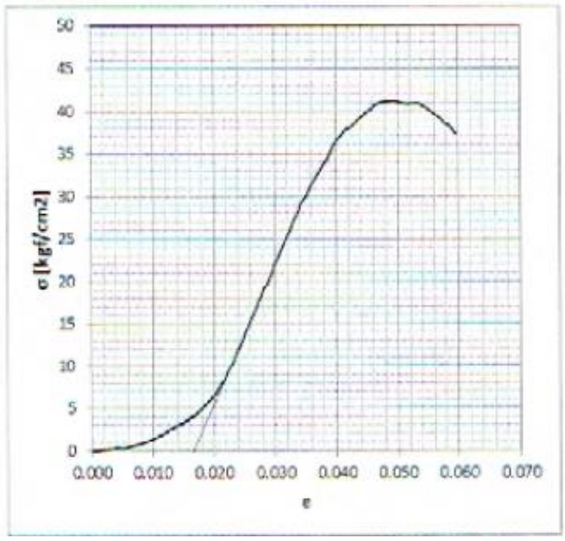


2.0% DMS-DS100

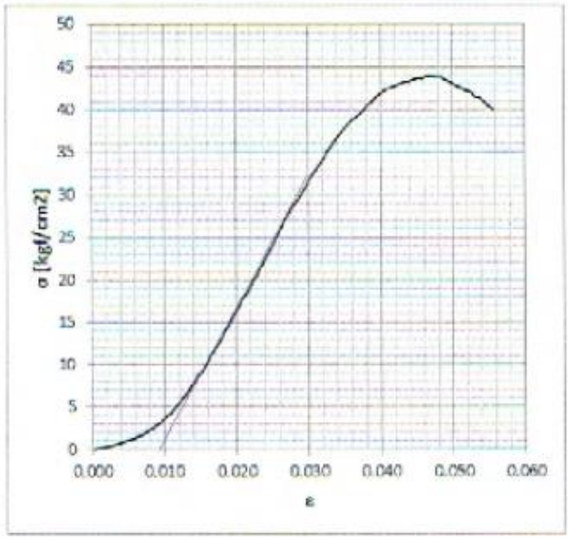


Process N°14227504 (DS DMS100 product)
ID: 1083

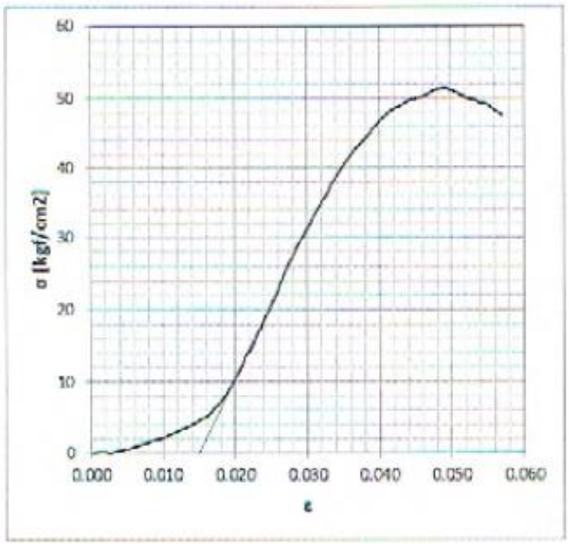
3.0% DMS-DS100



4.0% DMS-DS100

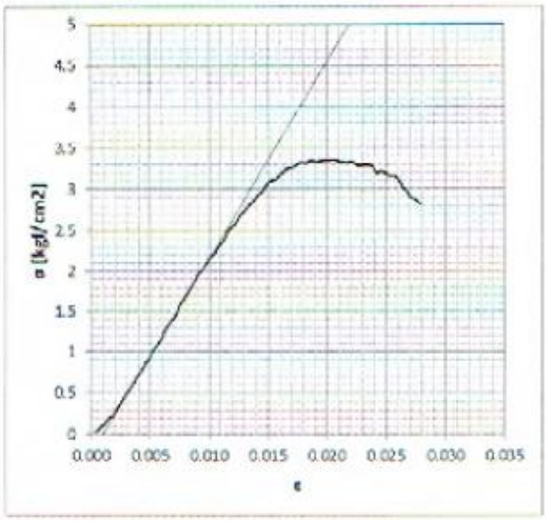


5.0% DMS-DS100

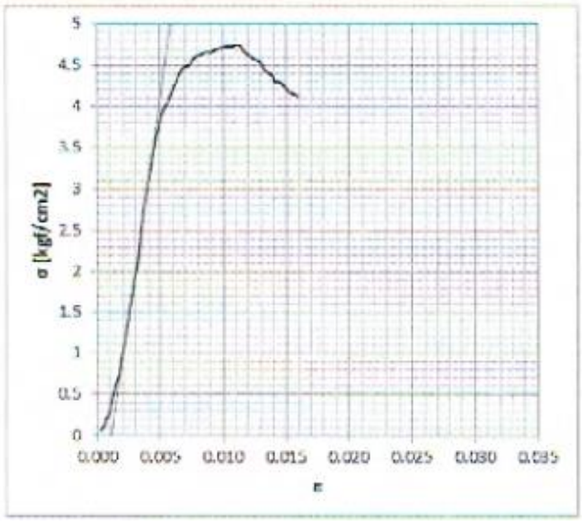


B) Rehumidified test tubes

0.25% DMS-DS100

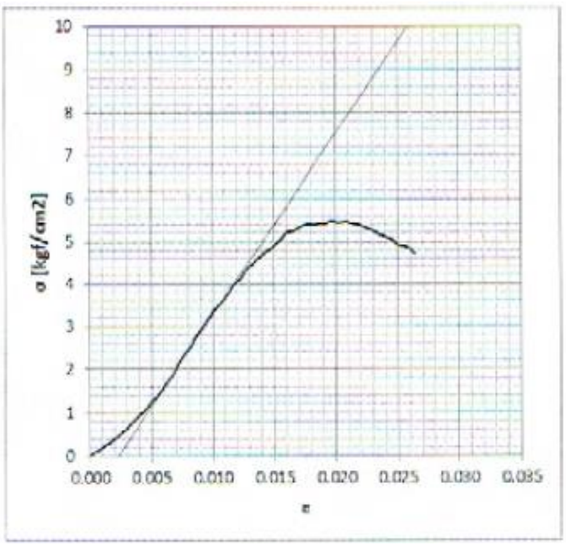


0.50% DMS-DS100

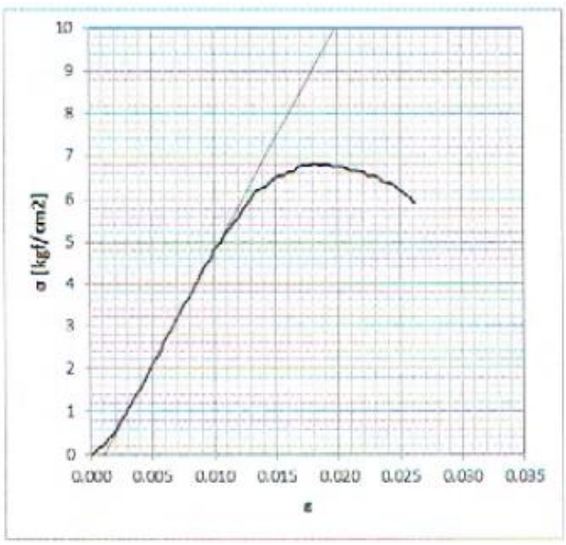


Process N°14227504 (DS DMS100 product)
ID: 1083

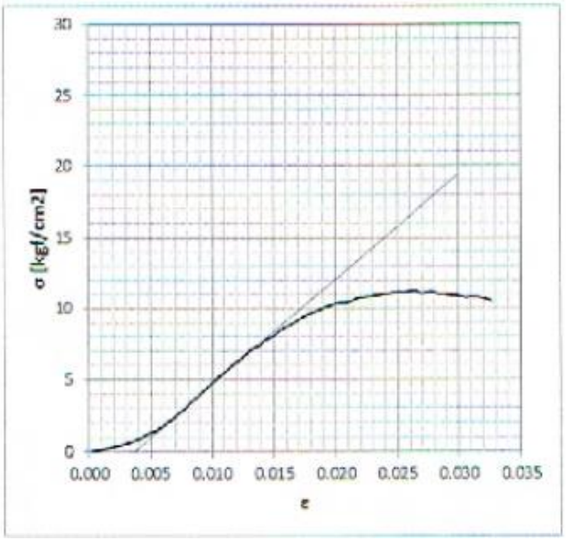
0.75% DMS-DS100



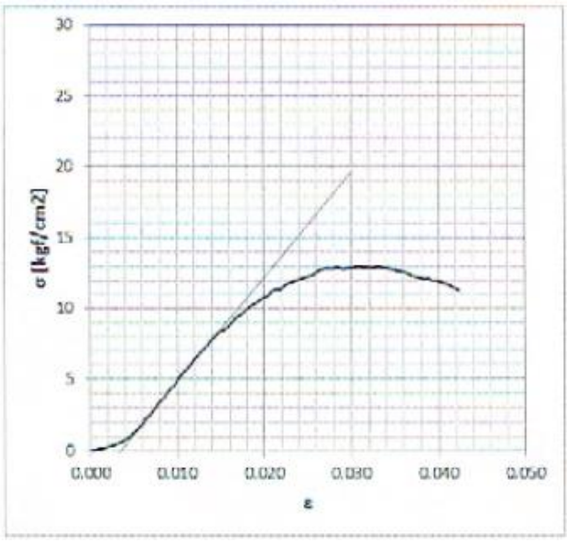
1.0% DMS-DS100



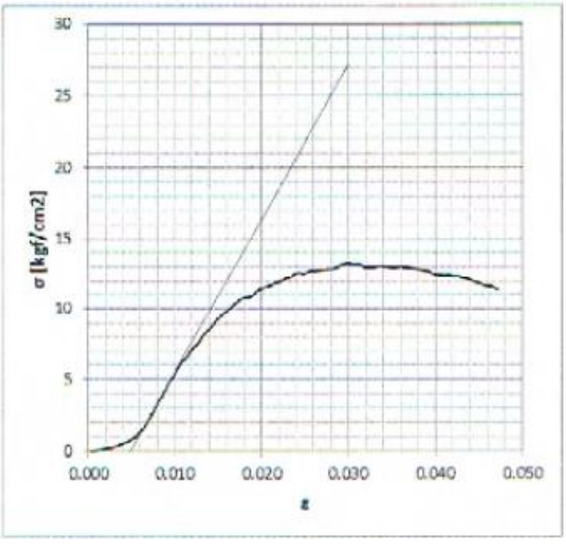
2.0% DMS-DS100



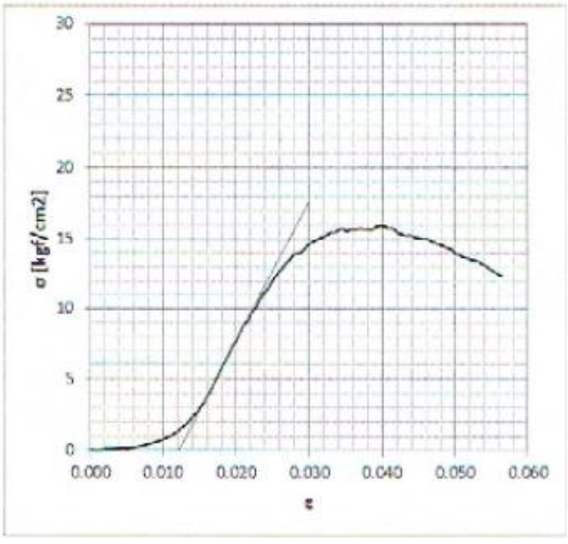
3.0% DMS-DS100



4.0% DMS-DS100



5.0% DMS-DS100



Process N°14227504 (DS DMS100 product)
ID: 1083